Enhanced photocatalytic H_2 evolution under visible light over $SrTiO_3$:Cr/Ta prepared by spray pyrolysis from polymeric precursor

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$SrTiO_3$:Cr/Ta powders were prepared by spray pyrolysis from polymeric precursors. Effects of the amount of co-dopant and additives on the photocatalytic activity for hydrogen evolution from aqueous methanol solution under visible light irradiation ($\lambda > 415$ nm) were investigated. For the photocatalyst prepared by spray pyrolysis from polymeric precursor, the hydrogen evolution rate was increased by a factor of ~100 and induction period was decreased by a factor of 8 compared with a photocatalyst prepared by solid state reaction. These enhancements result from increased roughness of surface, and the compositional uniformity which are intrinsic characteristics of spray pyrolysis. In addition, photocatalyst prepared by spray pyrolysis from polymeric precursor have large BET surface area and small amount of Cr^{6+} ion which is responsible for long induction period. It should be noted that the reduction of Cr^{6+} ion was achieved without hydrogen reduction process.